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Acute Suppurative Thyroiditis

Diagnostic, Metabolic and Therapeutic Observations

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ALTHOUGH acute suppurative thyroiditis has been seen infrequently in the antimicrobial era, this disorder presents diagnostic and therapeutic problems which must be rapidly solved in order to permit optimal treatment. The clinical, endocrine and scintiphotographic features of acute suppurative thyroiditis, as well as its treatment and natural history, are the subjects of this report.

Report of a Case

A 38-year-old woman was admitted to the University of California, Davis-Sacramento Medical Center following a ten-day illness characterized by fever, sore throat, dysphagia and erythema of the anterior neck. After the onset of cervical tenderness, the patient noted the development of nervousness, anorexia, weight loss, hoarseness, chills, palpitations and extreme lethargy. There was no known history of goiter or previous thyroid disease. The patient had been taking primidone, 250 mg three times a day, intermittently for a posttraumatic seizure disorder. There was also a history of gastrointestinal bleeding, ethanol abuse and surgical correction of severe thoracic scoliosis.

On examination the patient was in moderate distress, sitting upright with the neck flexed anteriorly. The pulse was 120 beats per minute and

regular, blood pressure was 110/70 mm of mercury and temperature taken orally was 38°C (100.4°F). Ocular examination showed a stare and lid lag but exophthalmometry gave normal findings. The pharynx was erythematous without exudate. The skin overlying the thyroid was tense and red. The jugular veins were distended. The thyroid was exquisitely tender and diffusely enlarged, with an estimated weight of 80 grams. There were no palpable nodules or areas of fluctuance. No bruit was audible and cervical lymph nodes were not palpable. The chest was clear to percussion and auscultation. Cardiac examination showed a regular rhythm and a grade II/VI ejection murmur. There were no extracardiac sounds. The liver was slightly enlarged and tender. A spleen tip was palpable below the left costal margin. The extremities were thin and wasted but without edema. A fine resting tremor was present. The deep tendon reflexes were brisk and symmetrical.

Admission laboratory data included a leukocyte count of 25,400 per ml with 34 percent bands, 51 percent segmented polymorphonuclear leukocytes, 5 percent lymphocytes and 10 percent monocytes. The erythrocyte sedimentation rate (Westergren) was 128 mm per hour. The hematocrit reading was 34.5; hemoglobin, 11.8 grams per 100 ml; sodium, 131 mEq per liter; potassium, 2.7 mEq per liter; chloride, 90 mEq per liter, and bicarbonate, 24 mEq per liter. Analysis of urine showed 1+ proteinuria. An electrocardiogram showed a sinus tachycardia at a rate of 140 and low voltage. On an x-ray study of the chest a right lateral thoracic scoliosis was noted with a Harrington rod in place. Bilateral apical pleural thickening was noted. Roentgenograms of the neck showed no widening of the prevertebral soft tissues; no abnormal gas accumulations were seen.

Initial thyroid function tests gave the following values: thyroxine (T_4) 4.8 μ g per 100 ml, triiodothyronine (T_3) resin uptake of 29.3 percent and a free thyroxine index (T_4) of 1.4 units. The thyrotropin (TSH) level was less than 3.3 μ U per ml. The protein bound iodine (PBI) level was 6.4 mg per 100 ml, and a 24° radioactive iodine (RAI) uptake was 3 percent. Subsequent thyroid data as well as the range of laboratory normals are indicated in Table 1.

Initially the differential diagnosis included acute suppurative thyroiditis, subacute (nonbacterial) thyroiditis and thyrotoxic Graves disease. This

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clinical presentation was further complicated by the possibility of acute ethanol withdrawal. The patient was treated with acetaminophen (600 mg. given orally every four hours), propranolol (20 mg given orally four times a day), and diazepam (5 mg given orally three times a day); a regimen of primidone (250 mg given orally three times a day) was maintained. On the second hospital day the patient's temperature was 39.3°C (102.8°F) and subsequently acute respiratory failure developed, presumably due to upper airway obstruction. Treatment with orotracheal intubation and ventilatory assistance was begun. Intravenous administration of nafcillin (2 grams every four hours) and hydrocortisone (1 gram immediately, then 250 mg every six hours) was instituted. Blood cultures taken on the first hospital day yielded group A β hemolytic streptococcus and penicillin (1 million units every four hours) was substituted for nafcillin. Her course over the next few days was marked by general improvement and the gradual development of fluctuance over the right lobe of the thyroid. On surgical exploration on the sixth hospital day a multiloculated abscess within the thyroid capsule was noted. This was explored by blunt dissection and three Penrose drains were left in place. Pus from the abscess yielded group A β hemolytic streptococcus. The temperature became normal four days after the initiation of antimicrobial therapy which was continued for a total of 13 days. The inflammation resolved gradually and the patient was discharged three weeks after admission.

Thyroid studies done at the time of discharge showed a T_4 of 2.9 μ g per 100 ml, a T_3 resin uptake of 29.2 percent and a T_7 of 0.8 units. A TSH was 12 μ U per ml and a repeat 24° RAI uptake was 18 percent while a scan showed patchy thyroid uptake with a defect in the right lower

lobe of the thyroid (Figure 1). Additional laboratory data showed the antistreptolysin titer to be greater than 250 Todd units. Antibody titers to mumps soluble and viral antigens were positive at a dilution of 1:8 in acute and convalescent sera.

Discussion

Acute suppurative thyroiditis was first described by Bauchet in 1857.¹ Several early reviews²⁻⁴ indicate that the disease was more common in the preantimicrobial era. However, it is likely that some of these cases were subacute thyroiditis, a more common disorder. *Streptococcus pyogenes*, *Staphylococcus aureus* and the pneumococci are the three organisms most commonly cultured from suppurative thyroiditis.^{5,6} Although less common, a wide variety of other bacteria have been isolated including *Salmonella typhosa*,^{3,7} *S. paratyphi A* and *B*,³ *S. enteritidis*,⁸ *Hemophilus influenzae*,⁹ *Escherichia coli*,⁶ *Klebsiella* species,¹⁰ *Streptococcus viridans*,^{11,12} *Actinomyces naeslundii*¹³ and *Mycobacterium intracellulare*.¹⁴ Anaerobic bacteria isolated from thyroid abscesses included *Bacteroides fragilis*¹⁵ and *B. melaninogenicus*;¹⁶ gas formation has been reported with the isolation of *Clostridium septicum*¹⁷ and in one case with the recovery of foul smelling pus which yielded no organisms on culture.¹⁸ The thyroid has also been involved in such chronic infections as tuberculosis, syphilis and echinococcosis.^{6,19}

The infecting agent may reach the thyroid via the blood, lymphatics, spread from contiguous structures, direct penetration due to trauma or from a persistent thyroglossal duct. The thyroid is quite resistant to infection when bacteria are injected directly into the thyroid arteries,²⁰ although underlying thyroid disease may enhance susceptibility. In one review⁵ half of the patients

TABLE 1.—Thyroid Function Tests

Interval from Admission	T_4 (3.0-11.0 μ gm Percent)	T_3 RU (22-33 Percent)	T_7 (1.0-3.0 units)	TSH (3.3-8.0 μ U/ml.)	Total T_3 RIA (60-200 ng/dl)	24° RAI Uptake (12-35 Percent)	PBI (4.0-8.0 mcg/dl)
1 day	4.8	29.3	1.4	<3.3	70	3	6.4
5 days	2.1	46.5	1.0			<1	
11 days	4.1	33.7	1.4	7.5			4.2
2 weeks	3.1	33.9	1.1	9.2	77		
3 weeks	2.9	29.2	0.8	12.0		18	
6 weeks	3.1	26.8	0.8	10.0			
6 months	2.3	26.4	0.6	6.9	105	12	
9 months	2.6	31.6	0.8	6.3			

T_4 =thyroxine
 T_3 RU=triiodothyronine resin uptake

T_7 =free thyroxine index
TSH=thyrotropin

RAI=radioactive iodine
PBI=protein bound iodine

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with suppurative thyroiditis also had adenomatous goiters and in these patients the infection was localized rather than diffuse.

Suppurative thyroiditis occurs most often in females^{2,3} and the highest incidence is found in the 20 to 40 age group.^{3,5} The disease is characterized by the abrupt onset of fever, chills and local signs of inflammation in the neck. Pain is usually severe, may be referred to the ear, mandible, or occiput, and is often aggravated by extension of the neck. Dysphagia and hoarseness are common. Most often the patient appears to be acutely ill with fever, tachycardia and pronounced leukocytosis. It is often difficult to differentiate this disorder from the more common subacute thyroiditis, which is generally a milder disease with less toxic manifestations, because either disease can present with widely varying severity. The PBI, T_4 and erythrocyte sedimentation rate are usually elevated in early subacute thyroiditis; the gland is diffusely involved and the radioiodine uptakes are classically low.²¹ However, all of these features may be present in acute suppurative thyroiditis. Differentiation is important because suppurative thyroiditis is usually a progressive disease which may be complicated by septicemia, airway obstruction, rupture of the abscess or septic thrombophlebitis. Subacute thyroiditis on the other hand is usually a self-limited disorder leading to recovery without complications within two to four months;²² usually, symptomatic treatment with analgesics or rarely corticosteroids is sufficient. Certainly, in a suspected case of unusual severity, blood cultures should be obtained. A lateral roentgenogram of the neck may help localize the area of inflammation to the thyroid and may show the presence of gas. Needle biopsy of the thyroid has been useful in making the diagnosis of suppurative thyroiditis and yields material for culture.²³ Because Gram-positive pyogenic cocci are most often responsible for suppurative thyroiditis, and penicillinase-producing staphylococci are prevalent in nonhospital environments, initial treatment with intravenous administration of nafcillin is recommended while results of bacterial cultures are pending. Corticosteroids may be useful in the presence of septicemia and shock.

Thyroid function (Table 1) during the course of acute suppurative thyroiditis is not well described in the literature. It is generally stated that the patient is euthyroid and radioiodine uptakes are normal.²⁴ These observations are often utilized

to differentiate this disorder from subacute thyroiditis where thyroid dysfunction is usually found as noted above. However, an increase in the level of serum T_4 may occur in acute suppurative thyroiditis from the release of preformed products into the circulation.²⁵ The RAI uptake may be reduced only over the abscess²⁵ or, as in this case, the total uptake may be low. In our patient there clearly were low radioiodine uptakes early in the course of illness and transient hypothyroidism as indicated by the elevation in plasma TSH (Table 1). This low radioiodine uptake suggests that the process was diffusely disrupting follicular function. However, a scan carried out three weeks after admission showed only the residual defect laterally compressing the right lobe where the abscess developed (Figure 1). Several other cases of acute suppurative thyroiditis, also had corresponding low RAI uptakes during the acute illness.^{12,14,16,26,27} We suggest that the radioiodine uptake can be notably suppressed in acute suppurative thyroiditis and that the value is of little use in differentiating this disorder from subacute thyroiditis. On the fifth hospital day a reduced

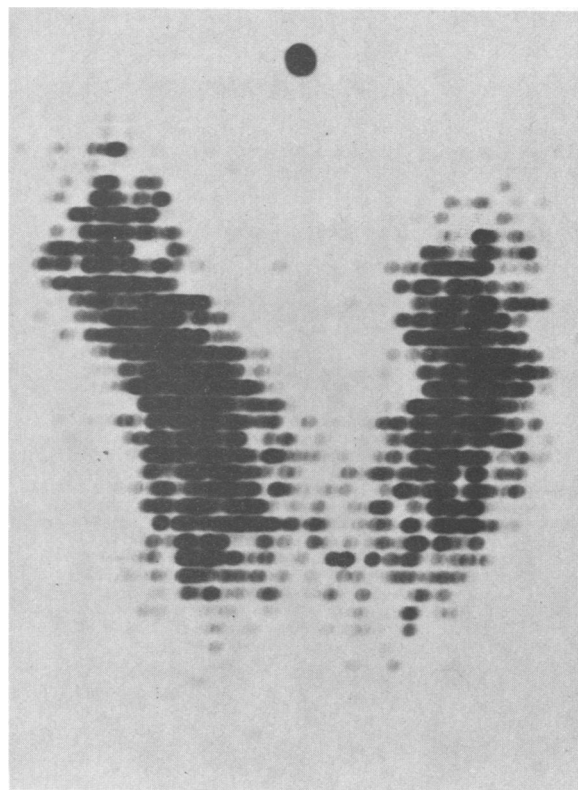


Figure 1.—Thyroid scan done three weeks after admission showing defect in the lateral right lobe.

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T₄ but elevated T₃ resin uptake was observed. This may in fact reflect stress induced depression of thyroid binding prealbumin.

In conclusion, it may not be possible with non-invasive procedures to positively differentiate acute suppurative thyroiditis from other thyroid disorders. Because of the desirability of prompt antimicrobial therapy for acute suppurative thyroiditis, blood cultures and early biopsy should be considered.

Summary

The case of a patient with group A β hemolytic streptococcal infection of the thyroid is reported. The literature pertaining to acute suppurative thyroiditis is reviewed and problems in differentiating this diagnosis from subacute (nonbacterial) thyroiditis are discussed. It is concluded that positive differentiation of acute suppurative thyroiditis from other thyroid disorders may not be possible with noninvasive techniques. The desirability of prompt antimicrobial therapy for acute suppurative thyroiditis requires early consideration of blood cultures and biopsy.

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